

Improving the Fidelity of Structural Analysis and Sizing in Multi-Disciplinary Design of Space Systems

Completed Technology Project (2013 - 2017)



Project Introduction

The focus of the proposed research will be to explore accurate methods for conceptual structural sizing that are more efficient than current processes, then to reap the benefits of such methods. The primary benefit will be the reduction of mass growth that typically occurs in space systems between the time when the initial design point is selected and when the final vehicle is produced. Additionally, the development of rapid and accurate structural sizing methods will enable more advanced design techniques such as probabilistic exploration of the design space and robust design. This will enable thorough exploration of design concepts that are currently deemed too risky to explore, such as composite space structures. These goals will be accomplished through automation of the manual process for developing the internal structural architecture of a space system. This automation will be achieved by creating mathematical models that generate internal structure based on overall vehicle geometry and applied loads. By removing a significant amount of manual tweaking from the structural design loop, rapid iteration with advanced design concepts can be performed.

Anticipated Benefits

The primary benefit of this research lies in the reduction of mass growth that typically occurs in space systems between the time when the initial design point is selected and when the final vehicle is produced. Additionally, the development of rapid and accurate structural sizing methods will enable more advanced design techniques such as probabilistic exploration of the design space and robust design. This will enable thorough exploration of design concepts that are currently deemed too risky to explore, such as composite space structures.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

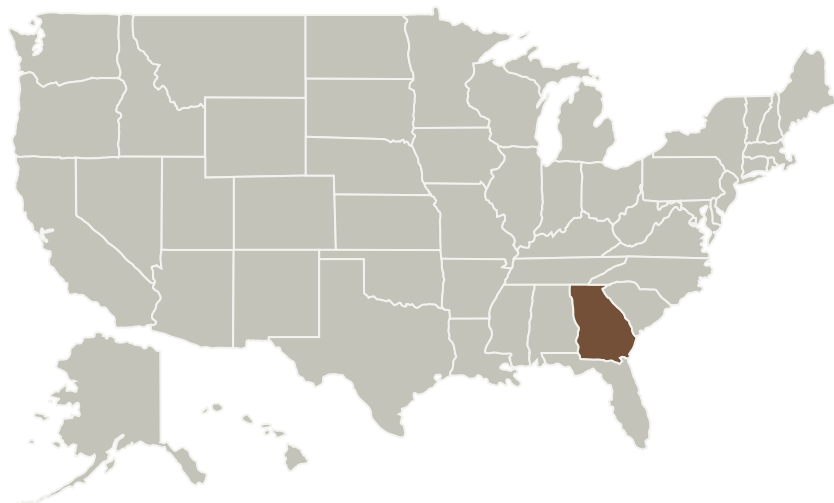
Space Technology Research Grants

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Georgia Institute of Technology-Main Campus(GA Tech)	Supporting Organization	Academia	Atlanta, Georgia

Primary U.S. Work Locations

Georgia

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

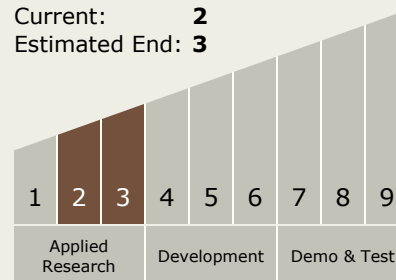
Alan W Wilhite

Co-Investigator:

August T Noever

Technology Maturity (TRL)

Start: 2
Current: 2
Estimated End: 3



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - TX12.3 Mechanical Systems
 - TX12.3.1 Deployables, Docking, and Interfaces